THE
LUNAR METHOD *Shorten'd in Calculation & Improv'd.*

LONGITUDE PRECEPTS *Invented* BY S. DUNN; K
Having Sights of Sun & Moon, &c.

1. To the observed Distance of Limbs, add Half a Degree, the Sum is the Rough Distance of Centres. In Ephemeris page 8. 9. 10. or 11. for the Month, near Sun, with this Rough Distance of Centres, take the Day & Rough Hour past Noon at Greenwich. In Ephemeris page 7. for the Month, with the Day & Rough Hour, take the Moon's Horizontal Parallax. Otherwise observe it.

2. In Linear Table XV; By the Month & Day, take the Sun's Semidiameter. By the Moon's Horizontal Parallax, take the Moon's Semidiameter. By the Moon's Altitude take the Seconds for Altitude. Add together the observed Distance of Limbs, the Sun's Semidiameter the Moon's Semidiameter & Seconds for Moon's Altitude; the Sum is L, the observed Distance of Centres. By Formula proceed, find A, B, the Correction for Refraction; & D.

3. By the Formula, proceed with D, the Sun's Altitude, Moon's Altitude, & Moon's Horizontal Parallax. Find the First Arc & Second Arc.

4. By the Formula, find E the true Distance of Centres nearly. When the Distance or Moon's Altitude are not many Degrees, find F thus. In Table of Moon's Horizontal Parallax & Parallax in Altitude take the Moon's Parallax in Altitude. In Linear Table IV. with this Parallax in Altitude, & E the Distance in Degrees, take the Seconds. With C in Minutes & E in Degrees take Seconds in the same Table. The Difference of those Seconds is F. Find P.

5. In Ephemeris page 8. 9. 10. or 11. for the Month, near Sun; Take two Distances one more the other leſs than P. By the Formula, proceed to the Time at Greenwich.

6. In Ephemeris page 2. or Linear Table XVI. Take the Sun's Declination for the Time at Greenwich past Noon. When the Declination & Latitude are both North or both South subtract the Declination from 90° the Remainder is the Polardistance. When the Declination & Latitude is one North the other South, add the Declination to 90°, the Sum is the Polardistance. By the Formula proceed to the Time at Ship. When the Observation is Before Noon, the Time at Ship is short of Noon. When the Observation is After Noon, the Time at Ship is past Noon. Greenwich Time & Ship's Time are the two Times. For a Forenoon Observation, their Sum is the Longitude West, & it's Remainder to 360°, is Longitude East. In an Afternoon Observation, their Difference is the Longitude; West when Greenwich Time is greatest & East when Greenwich Time is least.

7. With Star & Moon, Add Moon's nearest Semidiameter, but Subtract farthest. Find Star's Time past Meridian, or short of it. This & Sun's Right Aſcension, gives Ship's Time; & this with Greenwich Time gives the Longitude.

Published according to Act of Parliament March 27. 1788 by S. DUNN.

Linear Table XV for ☉'s Semidiameter, ☽'s Semidiameter, & Seconds for ☽'s Altitude; See Precepts.

by S. Dunn.

Sun's Semidiameter.

Days.	Jan.ʸ	Feb.ʸ	Mar.	Apr.	May.	June.
1	16.19	16.17	16.11	16.2	15.54	15.49
8	16.19	16.15	16.9	16.0	15.53	15.48
15	19.19	16.14	16.7	15.58	15.51	15.47
22	16.18	16.13	16.5	15.56	15.50	15.47
29	16.18	16.12	16.4	15.55	15.49	15.47

Days.	July.	Aug.	Sep.ʳ	Oct.	Nov.ʳ	Decem.
1	15.47	15.49	15.55	16.3	16.11	16.17
8	15.47	15.50	15.57	16.5	16.13	16.18
15	15.47	15.51	15.59	16.7	16.14	16.19
22	15.48	15.53	16.1	16.9	16.15	16.19
29	15.49	15.54	16.2	16.10	16.16	16.19

☽'s Hor. Par.ʳ ′ ″
54. 0
54. 5
54. 10
54. 15
54. 20
54. 25
54. 30
54. 35
54. 40
54. 45
54. 50
54. 55
55. 0
55. 5
55. 10
55. 15
55. 20
55. 25
55. 30
55. 35
55. 40
55. 45
55. 50
55. 55
56. 0
56. 5
56. 10
56. 15
56. 20
56. 25
56. 30
56. 35
56. 40
56. 45
56. 50
56. 55
57. 0
57. 5
57. 10
57. 15
57. 20
57. 25
57. 30
57. 35
57. 40
57. 45
57. 50
57. 55
58. 0

☽'s Semid.ʳ ′ ″
14. 43
14. 44
14. 45
14. 46
14. 47
14. 48
14. 49
14. 50
14. 51
14. 52
14. 53
14. 54
14. 55
14. 56
14. 57
14. 58
14. 59
15. 0
15. 1
15. 2
15. 3
15. 4
15. 5
15. 6
15. 7
15. 8
15. 9
15. 10
15. 11
15. 12
15. 13
15. 14
15. 15
15. 16
15. 17
15. 18
15. 19
15. 20
15. 21
15. 22
15. 23
15. 24
15. 25
15. 26
15. 27
15. 28
15. 29
15. 30
15. 31
15. 32
15. 33
15. 34
15. 35
15. 36
15. 37
15. 38
15. 39
15. 40
15. 41
15. 42
15. 43
15. 44
15. 45
15. 46
15. 47
15. 48

☽'s Hor. Par.ʳ ′ ″
58. 0
58. 5
58. 10
58. 15
58. 20
58. 25
58. 30
58. 35
58. 40
58. 45
58. 50
58. 55
59. 0
59. 5
59. 10
59. 15
59. 20
59. 25
59. 30
59. 35
59. 40
59. 45
59. 50
59. 55
60. 0
60. 5
60. 10
60. 15
60. 20
60. 25
60. 30
60. 35
60. 40
60. 45
60. 50
60. 55
61. 0
61. 5
61. 10
61. 15
61. 20
61. 25
61. 30
61. 35
61. 40
61. 45
61. 50
61. 55
62. 0

☽'s Semid.ʳ ′ ″
15. 49
15. 50
15. 51
15. 52
15. 53
15. 54
15. 55
15. 56
15. 57
15. 58
15. 59
16. 0
16. 1
16. 2
16. 3
16. 4
16. 5
16. 6
16. 7
16. 8
16. 9
16. 10
16. 11
16. 12
16. 13
16. 14
16. 15
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16. 17
16. 18
16. 19
16. 20
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16. 22
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16. 24
16. 25
16. 26
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16. 28
16. 29
16. 30
16. 31
16. 32
16. 33
16. 34
16. 35
16. 36
16. 37
16. 38
16. 39
16. 40
16. 41
16. 42
16. 43
16. 44
16. 45
16. 46
16. 47
16. 48
16. 49
16. 50
16. 51
16. 52
16. 53

Seconds to be added, for Degrees of Moon's Altitude, & Moon's Horizontal Parallax or Moon's Semidiamʳ.

☽'s Horˡ. Par.* ′	5°.	10°.	15°.	20°.	25°.	30°.	35°.	40°.	45°.	50°.	55°.	60°.	65°.	70°.	75°.	80°.	85°.	90°.	☽'s Semidiameter. ′ ″
54	1″	2″	3″	5″	6″	7″	8″	9″	10″	11″	11″	12″	13″	13″	13″	14″	14″	14″	14.43
56′	1″	2″	3″	5″	6″	7″	8″	9″	10″	11″	12″	13″	13″	14″	14″	15″	15″	15″	15.15
58′	1″	3″	4″	5″	7″	8″	9″	10″	11″	12″	13″	14″	14″	15″	15″	16″	16″	16″	15.48
60′	2″	3″	4″	5″	7″	8″	10″	11″	12″	13″	14″	15″	15″	16″	16″	17″	17″	17″	16.21
62′	2″	3″	5″	6″	8″	9″	11″	12″	13″	14″	15″	16″	17″	17″	18″	18″	19″	19″	16.53

The three parts of this Table, are taken out by Inspection, & work as per Formula.

Published according to Act of Parliament March 27. 1788 by S. Dunn.

A Table for reducing Declinations of Fourth Years, to other Years, By S. Dunn.

This Table, has the nearest Days to & preceding the Equinoxes & Solstices.

1st Year.	Days.	Minutes. Tenths.	Notes.	2d Year.	Days.	Minutes. Tenths.	Notes.	3d Year.	Days.	Minutes. Tenths.
January	1	4; Sub.	S. Subtractive.	Jan.	1	2;8 S.	S. S ends.	Jan.	1	1,6 S.
	10	7,0 S.			10	4,8 S.			10	2,6 S.
	20	10,0 S.			20	6,9 S.			20	3,6 S.
	30	12,7 S.			30	8,7 S.			30	4,6 S.
Feb.	10	14,9 S.		Feb.	10	10,1 S.		Feb.	10	5,4 S.
	20	16,4 S.			20	11,2 S.			20	5,9 S.
	28	17,4 S.			28	11,8 S.			28	6,2 S.
Mar.	1	5,4 add.	Divide the given Year by 4, & if 1 remains it is a First Year; If 2 remains, it is a Second Year; If 3 remains it is a Third Year; If 0 remains, it is a Fourth Year, & the Declination is in its Table.	Mar.	1	11,0 add.	In a First. Second, & Third Year the Minutes & Tenths in this Table, added to or subtracted from the Degrees, Minutes & Tenths for Fourth Year, gives the Declination nearly.	Mar.	1	16,6 add.
	10	5,6 a.			10	11,4 a.			10	17,1 a.
	19	5,6 a.			19	11,4 a.			19	17,3 a.
	30	5,5 S.			30	11,2 S.			30	17,0 S.
Apr.	10	5,3 S.		Apr.	10	10,8 S.		Apr.	10	16,1 S.
	20	5,0 S.			20	9,9 S.			20	15,0 S.
	30	4,4 S.			30	8,9 S.			30	13,4 S.
May.	10	3,7 S.		May.	10	7,7 S.		May.	10	11,4 S.
	20	3,0 S.			20	6,0 S.			20	9,1 S.
	30	2,1 S.			30	5,3 S.			30	6,5 S.
June.	10	1,1 S.		June.	10	2,2 S.		June.	10	3,3 S.
	20	0,1 S.			20	0,2 S.			21	0,1 S.
	30	0,9 a.			30	1,8 a.			30	2,6 a.
July.	10	1,9 a.		July.	10	3,7 a.		July.	10	5,5 a.
	20	2;2 a.			20	5,5 a.			20	8,2 a.
	30	3,5 a.			30	7,1 a.			30	11,6 a.
Aug.	10	4,4 a.		Aug.	10	8,6 a.		Aug.	10	12,9 a.
	20	4,8 a.			20	9,6 a.			20	14,5 a.
	30	5,2 a.			30	10,5 a.			30	15,7 a.
Sep.	10	5,7 a.		Sep.	10	11,1 a.		Sep.	10	16,7 a.
	21	6,0 a.			21	11,3 a.			22	17,6 a.
	30	5,6 S.			30	11,4 S.			30	17,1 S.
Oct.	10	5,6 S.		Oct.	10	11,0 S.		Oct.	10	16,7 S.
	20	5,2 S.			20	10,4 S.			20	15,8 S.
	30	4,8 S.			30	9,6 S.			30	14,4 S.
Nov.	10	4,1 S.	a. additive.	Nov.	10	8,2 S.	a. a ends.	Nov.	10	12,3 S.
	20	3,2 S.			20	6,5 S.			20	9,9 S.
	30	2,3 S.			30	4,7 S.			30	7,0 S.
Dec.	10	1,3 S.		Dec.	10	4,5 S.		Dec.	10	3,8 S.
	20	0,3 S.			20	0,3 S.			21	0,1 S.
	30	1,0 a.			30	2,0 a.			30	3,0 a.
	31	1,2 a.			31	2,2 a.			31	3,3 a.

Linear Table XVII.

Published according to Act of Parliament April 30. 1788 by S. Dunn.

A Fourth YearTable, of Sun's Declination for Noon, to be used with Lin.r Tab. XVI or XVII.

By S. Dunn.

Publish'd according to Act of Parliament April 30. 1788 by S. Dunn.

Days	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.
	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths	° ′ Tenths
1	23. 1,0S.	17. 5,3S.	7. 11,4S.	4.55,6N.	15. 22,2N.	22. 11,6N.	23. 4,3N.	17.48,8N.	7.57,6N.	3.33.4S.	14.45,8S.	21.59, 1S.
2	22.55,8	16.48,1	6.48,4	5.18,6	15.40,0	22.19,2.	22.59,7	17.33,3	7.35,6	3.56,7	15. 4,7	22. 7,8
3	22.50,1	16.30,5	6.25,4	5.41,5	15.57,5	22.26,4	22.54,7	17.17,5	7.13,5	4.20,0	15.23,4	22.16,0
4	22.43,9	16.12,6	6. 2,3	5. 4,3	16.14,7	22.33,3	22.49,3	17. 1,4	6.51,3	4.43,1	15.41,8	22.23,9
5	22.37,3	15.54,6	5.39,1	6.27,0	16.31,7	22.39,7	22.43,5	16.45,1	6.29,0	5. 6,2	16. 0,0	22.31,3
6	22.30,3	15.36,2	5.15,8	6.49,6	16.48,5	22.45,8	22.37,4	16.28,4	6. 6,5	5.29,3	16.17,8	22.38,3
7	22.22,8	15.17,5	4.52,5	7.12,1	17. 4,9	22.51,4	22.30,8	16. 11,5	5.44,0	5.52,3	16.35,5	22.44,8
8	22.14,9	14.58,6	4.29,1	7.34,4	17.21,0	22.56,6	22.23,9	15.54,4	5.21,3	6.15,2	16.52,8	22.50,8
9	22. 6,5	14.39,5	4. 5,6	7.56,6	17.36,9	23. 1,5	22.16,5	15.37,0	4.58,6	6.38,0	17. 9,8	22.56,5
10	21.57,8	14.20,1	3.42,1	8.18,7	17.52,4	23. 5,9	22. 8,8	15.19,3	4.35,7	7. 0,8	17.26,6	23. 1,6
11	21.48,5	14. 0,5	3.18,6	8.40,6	18. 7,7	23. 9,9	22. 0,7	15. 1,4	4.12,8	7.23,4	17.43,0	23. 6,3
12	21.38,9	13.40,6	2.55,0	9. 2,5	18.22,7	23.13,6	21.52,2	14.43,2	3.49,8	7.46,0	17.59,2	23.10,5
13	21.28,9	13.20,5	2.31,3	9.24,1	18.37,4	23.16,8	21.43,3	14.24,8	3.26,8	8. 8,5	18.15,0	23.14,3
14	21.18,4	13. 0,2	2. 7,6	9.45,6	18.51,7	23.19,6	21.34,1	14. 6,2	3. 3,7	8.30,8	18.30,6	23.17,7
15	21. 7,5	12.39,7	1.44,0	10. 7,0	19. 5,7	23.22,0	21.24,5	13.47,3	2.40,5	8.53,0	18.45,7	23.20,5
16	20.56,2	12.19,0	1.20,3	10.28,1	19.19,4	23.24,0	21.14,5	13.28,3	2.17,3	9.15,1	19. 0,6	23.22,9
17	20.44,5	11.58,1	0.56,6	10.49,2	19.32,8	23.25,6	21. 4,2	13. 9,0	1.54,0	9.37,1	19.15,1	23.24,8
18	20.32,4	11.36,9	0.32,9	11.10,0	19.45,8	23.26,7	20.53,5	12.49,4	1.30,7	9.58,9	19.29,3	23.26,3
19	20.20,0	11.15,6	0. 9,2S	11.30,7	19.58,6	23.27,5	20.42,5	12.29,7	1: 7,3	10.20,5	19.43,1	23.27,2
20	20. 7,1	10.54,2	0.14,4N.	11.51,1	20. 11,0	23.27,8	20.31,1	12. 9,8	0.43,9	10.42,0	19.56,5	23.27,7
21	19.53,9	10.32,5	0.38,1	12. 11,4	20.23,0	23.27,7	20.19,3	11.49,7	0.20,5N.	11. 3,4	20. 9,6	23.27,7
22	19.40,3	10.10,7	1. 1,8	12.31,5	20.34,7	23.27,2	20. 7,3	11.29,5	0. 2,9S.	11.24,6	20.22,3	23.27,3
23	19.26,3	9.48,8	1.25,4	12.51,3	20.46,0	23.26,3	19.54,8	11. 9,0	0.26,3	11.45,6	20.34,7	23.26,4
24	19.12,0	9.26,7	1.49,0	13.11,0	20.57,0	23.25,0	19.42,1	10.48,4	0.49,7	12. 6,5	20.46,6	23.25,0
25	18.57,3	9. 4,6	2.12,5	13.30,4	21. 7,6	23.23,3	19.29,1	10.27,5	1.13,2	12.27,1	20.58,2	23.23,2
26	18.42,3	8.42,1	2.36,0	13.49,7	21.17,9	23.21,1	19.15,7	10. 6,6	1.36,6	12.47,5	21. 9,3	23.20,8
27	18.26,9	8.19,6	2.59,4	14. 8,6	21.27,8	23.18,6	19. 2,0	9.45,5	2. 0,0	13. 7,8	21.20,1	23.18,0
28	18.11,2	7.57,0	3.22,8	14.27,4	21.37,3	23.15,6	18.48,0	9.24,2	2.23,4	13.27,8	21.30,5	23.14,8
29	17.55,2	7.34,2	3.46,1	14.45,9	21.46,4	23.12,2	18.33,6	9. 2,7	2.46,8	13.47,7	21.40,4	23.11,1
30	17.38,9		4. 9,4	15. 4,2	21.55,2	23. 8,5	18.19,0	8.41,2	3.10,1	14. 7,3	21.50,0	23. 6,8
31	17,22,2		4,32,6		22. 3,6		18. 4,0	8.19,4		14.26,6		23. 2,2

Short RULES *for* PRACTICAL NAVIGATION; *By* S. DUNN.

1 Get the true Courses cleared. With these & the Distances, in Nautic Tables, take the Differences of Latitude, & true Departures. Get the true Difference of Latitude made good & true Departure made good, at End of each 24 Hours. With Difference of Latitude & Latitude from, get Latitude in.

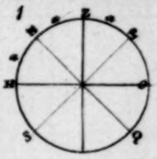
2. Add together the Latitude in & Latitude from, Half the Sum is Middle Latitude. In Nautic Tables, find Middle Latitude under Degrees & in the same Column true Departure under word Lat. then under word Dist. are the Minutes of Difference of Longitude. These in Degrees & Minutes applied to the Longitude from, gives Longitude in.

3. Instruments applied for Latitude by Sun, Moon or Stars out of Meridian, or for Longitude, should have a double Nonius, one to be read when observed, the other after by replaceing the Index. The Medium of the Nonius Minutes corrects the Errors of the Arch. In Order to correct the Longitude. In Nautic Tables, under Difference of Latitude, & Departure, is true Course & Distance made good.

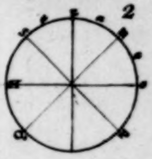
4. By Formula, take the Latitude. With the Difference of this & that by Account, apply either the true Course made good or true Distance made good, by Nautic Tables, this corrects the Departure made good, the Difference of Longitude & Longitude in.

5. Fig. 1. 2. are Cases of North & South Latitude by Meridian Altitudes, Z Zenith. E Equator. HO Horizon. P or S the Pole. a the Sun Moon or Star. Ea the Declination. Ha the Altitude looking South. Oa the Altitude looking North. Za the Zenith distance. ZE or OP & ZE or HS the Latitude.

1

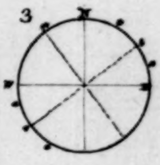


2

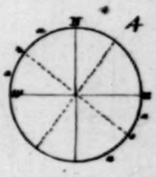


6. Fig. 3 4. are Cases of Amplitude. N the true North. E true East. W true West. e the magnetic East. w magnetic West. n magnetic North. a the Sun, Moon or Star. Ee, Ww or Nn the Variation, East or West.

3

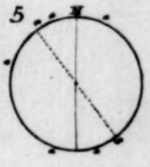


4

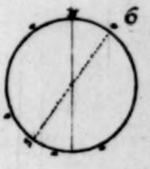


7. Fig. 5. 6. are Cases of Azimuths. N the true North. a the horizontal Bearing of Sun, Moon or Star. n the magnetic North. Na the true Azimuth. na the magnetic Azimuth. Nn the Variation. In North Latitude observe & compute from the North, & in South Latitude from South Point of the Horizon.

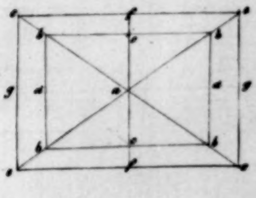
5



6



8. In a Sea Chart, a & e are two Places. ae & bd Meridians parallel to each other. ad & bc Perpendiculars to the Meridians. eg parallel to ac. ef parallel to ad. ac the northing or southing of e in Miles. bc the easting or westing of e in Miles. ab the Distance of ae in Miles. fe Difference of Longitude in Minutes.



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